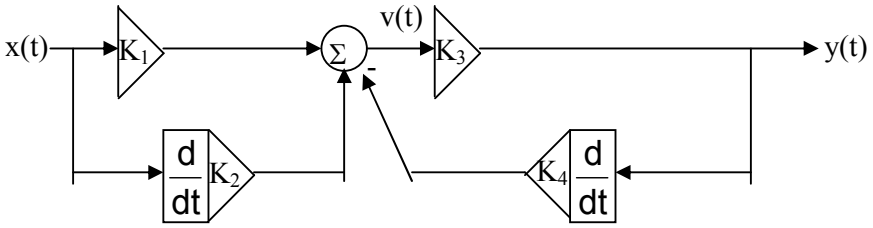
2.7. Sistem Dinyatakan Dengan persamaan Differensial

Beberapa sistem dapat dinyatakan dengan persamaan differensial :

$$\frac{d^n y}{dt^n} + a_{n-1}\frac{d^{n-1} y}{dt^{n-1}} + ... + a_1\frac{dy}{dt} + a_0 y = b_m\frac{d^m x}{dt^m} + b_{m-1}\frac{d^{m-1} x}{dt^{m-1}} + ... + b_1\frac{dx}{dt} + b_0 x$$

Contoh :
Carilah persamaan differensial untuk sistem



Jawab :

$$v(t) = k_1 x(t) + k_2\frac{dx(t)}{dt} - k_4\frac{dy(t)}{dt}$$

$$y(t) = k_3 v(t)$$

$$= k_1 k_3 x(t) + k_2 k_3\frac{dx(t)}{dt} - k_3 k_4\frac{dy(t)}{dt}$$

$$k_3 k_4\frac{dy(t)}{dt} + y(t) = k_2 k_3\frac{dx(t)}{dt} + k_1 k_3 x(t)$$

$$\frac{dy(t)}{dt} + \frac{1}{k_3 k_4} y(t) = \frac{k_2}{k_4}\frac{dx(t)}{dt} + \frac{k_1}{k_4} x(t)$$